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tial element in their demonstration.² Brahmagupta, then, in this instance retailed, without fully comprehending, the knowledge of his predecessors. When the stationary character of Hindu intellect is taken into the account, we shall see reason to conclude that all we now possess of Hindu science is but part of a system, perhaps of much greater extent, which existed at a very remote period, even antecedent to the earliest dawn of science among the Greeks, and might authorize as well the visits of sages as the curiosity of conquerors.

TEL SUGGESTIONS FOR THE FORMATION OF A UNIVERSAL LANGUAGE.

From very early times thinkers have felt the diversity of languages in the different parts of the world to be a great disadvantage and handicap to the progress of the human race.

So have arisen the legends of the "golden age" when all men, and even the animals, had a common speech, and of the loss of this blessing following the loss of innocence.

Although we do not, perhaps, to-day think that if we could give to all nations a common tongue the world would return to a state of primeval blessedness, there are nevertheless many persons in many lands who feel that such a gift would be an inestimable boon to mankind.

That this is the case is evident from the widespread welcome which has of late years been accorded to such notable attempts in this direction as *Volapük*, *La Langue Bleue* of M. Bollack, *Esperanto*, and its successor *Ido*.

These, despite their simplicity of construction and many other excellent points, either have failed, or probably will fail, to achieve what their inventors hoped for them. And the cause of such failure should most likely be looked for in the fact that their originators have not gone to the root of the matter.

A knowledge of Esperanto or Ido, for instance, is doubtless easily acquired by a European, especially if he has a slight knowl-

²This argument has been overlooked by the author of the two able articles on Hindu algebra in the 42d and 57th numbers of the *Edinburgh Review*. It is of particular force in one instance: the elegant property discovered by Ptolemy and annexed at the end of the sixth book of Simson's edition of Euclid. (Note by Herschel.)

edge of Latin and a couple of other European languages besides his own; but it cannot be particularly easy for a Chinaman, a Japanese or a South Sea Islander, owing to the fact that its vocabulary is based upon those of Europe.

Knowing that the inventors of these languages and many other scholars, all far more learned and with far greater opportunities for studying the matter than will ever be his, have given much time and thought to this question, it is naturally with great diffidence that the present writer asks the attention of the public to the scheme which follows, in which, it seems to him, lies the germ of a language framed on scientific principles, a language as easily acquired by the Tartar and the Fijian as by the Englishman and the Italian, a language whose relationship to thought will be analogous to that of phonetic shorthand to speech.

Man as a maker of language must in the beginning have been in the disadvantageous position of not being able to discuss the best way to set about it until he could manage to make himself understood somehow. And by that time the mischief was done.

Now let us for a moment indulge in the extravagant supposition that man in the beginning, though rational and intelligent as now, was dumb. Let us further imagine that he had perfected a code of dumb-show signals by which he could communicate to his fellows every idea which occurred to him. Then let us suppose that all of a sudden the gods—seized by one of these whims which must have made them so difficult to get on with in those times—sent down a messenger with the gift of articulate speech. What would the humans have done? Doubtless, being intelligent as we said, they would have called a solemn assembly of the whole race to decide what was the best use to make of the new possession. They would at once have perceived that sounds would make a much more convenient medium for the expression of thought than sign-making, if once they should agree as to what idea each sound should express. They would first of all carefully try how many distinct and different sounds they could produce. The result of this inquiry would show that there were about sixteen consonant sounds which most of them could enunciate clearly—though certain individuals here and there found some difficulty with two or three of them—and about ten clearly defined vowel sounds. They would then consider whether with this small number of sounds it was possible to express the manifold ideas which from time to time they would need to communicate to each other.

After what would probably be a somewhat lengthy and very animated discussion, the chairman would call upon a noted sign-maker to sum up the result of their deliberations. This gentleman would then address his spectators in their sign language, showing that, as far as he could gather it, the general sense of the meeting was that, with strict economy of the material to be worked on, it would be possible to use speech as a medium for the exchange of ideas; that it was the intention of the conference to appoint a committee to draw up a scheme for this purpose; that before electing the members of that committee and deciding on the date of their next meeting at which the said scheme should be submitted for common approval, it would be as well to summarize broadly the lines on which they wished their committee to work. The chief points to which they would direct the attention of the committeemen were:

1. That to each sound should be allotted a general idea, particular ideas being expressed by the combination of these sounds into words or syllables.
2. That in so far as it was possible to avoid doing so, two different ideas should not be expressed by the same concatenation of sounds.
3. That the grammatical construction of the language should be as simple as it could be made, the necessary rules once decided on being applied consistently and without exceptions.
4. That if it were found possible to give adequate expression to all ideas without making use of such sounds as offered difficulty to this or that portion of the human race, it should be done; that if not, they should be used as sparingly as possible.

We can imagine that the meeting would then break up after having elected the committee and passed a resolution pointing out the evil results which might follow if any one tried to express himself in speech before the date of the next meeting and the final adoption of a scheme.

We can also imagine that at the next "general meeting" of the human race, the signalman of the committee, in the few remarks with which he would introduce the report, would state that, while his fellow committeemen and himself felt that they had succeeded in carrying out the wishes of their electors with regard to recommendations Nos. 1 and 3, they had not been quite so successful in the cases of Nos. 2 and 4.

With regard to No. 2: Owing to the fact that ideas were many

and consonants few they had found it necessary to allot to each of this class of sound two meanings, and even to use some of them in a third sense in forming inflexions, and it thus sometimes happened that the same group of sounds did represent two ideas. Thus *it-ar* would be found to stand for "was dark" and *i-tar* for "to darken," and *it* to mean "was" and also "cold," but that he did not feel that any confusion was likely to result from this.

With regard to recommendation No. 4: The committee, owing to this same paucity of consonants, had felt constrained to make use of certain sounds which he feared a large number of his fellow men had a difficulty in enunciating. These were notably *r*, *s* and *th*. But he would like to point out to his Chinese, Polynesian and French friends that even if these sounds were a little bit hard to say, they were at least quite easy to write, and that communication with distant peoples would largely be written. And here, in a few well-chosen contortions and grimaces, he would explain the method and intention of the art of writing, which he and his fellow committeemen would doubtless have invented and included as an appendix in their report.

Having, he hoped, not unduly trespassed on his spectators' time, he now had great pleasure in submitting to them the result of the committee's deliberations in the form of a rational language to which they had provisionally given the name of *Təl* (pronounced like "tail") and meaning, as they would shortly be in a position to see for themselves, "The Easily Understood." And the great scheme itself might very well have been in substance that which follows.

Convention I.

Every idea which occurs to us comes through the medium of one of the five senses; and by a happy coincidence five happens to be the number of the clearly differentiated vowel sounds in common use among mankind. Here then we have the basis of the first convention of our rational language.

Let each vowel connote one of the five senses. It does not matter much which vowel stands for which sense, so long as we are all agreed. So we will allot them as follows: *a* to seeing, *e* to hearing, *i* to touch, *o* to taste, *u* to smell.

Our first lesson then, is that whenever the vowel *a* occurs in a syllable its meaning has something to do with seeing; whenever *e* occurs the meaning of the syllable has something to do with hearing, and so on of the other three vowels.

Convention II.

Ideas being many and the sounds which we are capable of uttering but few, we shall have to give each of the consonants two values according to its position in the syllable. This brings us to the second convention: Every word beginning with a consonant other than *n* is a noun, and each consonant standing at the beginning of a word shall have a definite meaning. Here again the allotting of the meanings is arbitrary, but not without considerable thought the following table has been drawn up:

Each word beginning with <i>b</i>				is the name of a beast,					
"	"	"	"	<i>v</i>	"	"	"	"	bird,
"	"	"	"	<i>p</i>	"	"	"	"	fish or reptile,
"	"	"	"	<i>f</i>	"	"	"	"	invertebrate animal,
"	"	"	"	<i>g</i>	"	"	"	"	solid, mineral, etc.
"	"	"	"	<i>r</i>	"	"	"	"	liquid,
"	"	"	"	<i>l</i>	"	"	"	"	gas, vapor,
"	"	"	"	<i>m</i>	"	"	"	"	human being,
"	"	"	"	<i>k</i>	"	"	"	"	plant,
"	"	"	"	<i>s</i>	"	"	"	"	limb, member, part,
"	"	"	"	<i>z</i>	"	"	"	"	manufactured article,
"	"	"	"	<i>d</i>	"	"	"	"	thing,
"	"	"	"	<i>t</i>	"	"	"	"	abstraction,
"	"	"	"	<i>sh</i>	"	"	"	"	shape, space,
"	"	"	"	<i>th</i>	"	"	"	"	time, weather.

Convention III.

The consonants when they occur in the middle or at the end of a word shall have the values given in the table below. These values are adjectival or adverbial as the sense requires. Their meaning also varies slightly according to the vowel with which they are combined.

Thus *b* has the general meaning of "good," "well," and so when combined with the vowel *a* means "good to see," i. e., "beautiful." When combined with the vowel *e*, it means "good to hear," i. e., "musical." When combined with *i* it means "good to feel," i. e., "pleasant." When combined with *o* it means "good to taste," and when with *u* "good to smell," i. e., "sweet-scented."

TABLE SHOWING THE VALUES OF THE CONSONANTS ACCORDING TO THE VOWELS WITH WHICH THEY ARE USED.

	A SIGHT	E HEARING	I TOUCH	O TASTE	U SMELL
B	Kindly Beautiful	Kindly Musical	Kindly Pleasant	Good	Sweet
K	Unkindly Ugly	Unkindly Unmusical	Harmfully Unpleasant	Nasty	Foul
D	Fixedly Motionless	Continuously Deep	Firmly Firm	Strong	Strong
F	Dimly Small	Faintly Faint	Lightly Light	Slightly Inspid	Slightly Faint
G	Keenly Great	Keenly Loud	Heavily Heavy	Keenly Strong	Keenly Strong
L	Graciously Female, Slen- der	Graciously Treble	Caressingly Soft	Sweet	Soothing
M	Sternly Male	Attentively Bass	Masterfully Hard	Salt	Stimulating
N	Down Low	Murmuring	Aching	Bitter	Rank
P	Lightly Light	Lightly Shrill	Lightly Sharp (pointed)	Lightly Acid	Lightly Sour
R	Frowningly Dark	Rumbling	Roughly Rough	Rich	Musty
S	Swiftly Swift	Swiftly Hissing	With Movement Moving		
T	Coldly Blue	Metallic	Cold	Cold	Etherlike
V	Upwards High	Whistling	Stimulating	Alcoholic	Heady
Z	Warmly Red	Thrilling	Eagerly Hot	Greedily Hot	Greedily Pungent
TH	Straight Level	Flat	Evenly Smooth	Flat	
SH	Yellow	Sharp	Sharply Sharp (edged)		

We are now in the position to form a large number of nouns of one syllable, each consisting of three letters.

For instance let us take the word *bag*. This begins with *b* and is therefore the name of an animal of mammalian order; its vowel

is *a* which means "appears"; *g* is the adjective "great." *Bag* is, then, "the animal which looks big." This may be the elephant. It may be objected that it may just as well be the hippopotamus. That is so; but we shall be able presently to add a second syllable which will define it more clearly.

Beg, a reference to the tables will show to be "the loud-voiced animal"; *big*, "the heavy animal"; *bog* is "the strongly-flavored animal," and *bug* "the strongly-smelling animal"—obviously the skunk or the polecat.

At this stage the student will find it an interesting and useful exercise to take any two consonants and put the five vowels in turn between them, and then write down the meaning of the resulting word. In doing so, he must bear in mind that *bag* is the animal which appears great, not the animal which sees greatly, i. e., the keen-sighted animal; that *beg* is the animal which is heard greatly, not the animal with a keen sense of hearing. We shall come to these others by and by.

We may also form a large number of simple adjectives. These begin with a vowel and consist of two letters only. From *k* which means "bad," we get *ak*, "ugly"; *ek*, "unmusical"; *ik*, "unpleasant to the touch"; *ok*, "nasty"; *uk*, "foul-smelling."

The verb "to be" is expressed by the letter *i*, and this vowel as a prefix is the characteristic of all other verbs. By placing it before each of the vowels we get the five verbs: *ia*, "to see"; *ie*, "to hear"; *ii*, "to feel"; *io*, "to taste"; *iu*, "to smell."

From each of these are formed two other verbs with the aid of each of the consonants. In the case where the consonant precedes the sense vowel the latter has an active meaning, and where the consonant follows the sense vowel it has a passive meaning. A few examples will make this clear:

Iga is "to see greatly," i. e., "to gaze"; *iag* is "to appear great," i. e., "to loom." *Ige* is "to have a keen sense of hearing," *ieg* "to sound loud." *Igi* is "to have a keen sense of touch," *iig* "to feel big, i. e., "to be heavy, to weigh." *Igo* is "to have a keen sense of taste," *iog* "to be strong-flavored." *Igu* is "to have a keen sense of smell," *iug* "to be strong-scented."

Having got so far, we are enabled to form a new series of nouns by placing consonants before the verbs of the *iga* type, e. g.: *Miga*, "the gazer"; *biga*, "the far-sighted animal, the greyhound"; *viga*, "the hawk"; *sigi*, "the organ which has a keen sense of touch, the finger"; *bigu*, "the hound."

Convention V.

Adverbs are formed by the addition of the letter *u* to adjectives. Thus *ab*, "beautiful," gives *abu*, "beautifully"; *af*, "small," gives *afu*, "little, slightly"; *av*, "high," gives *avu*, "up, upwards."

Convention VI.

The preposition "of" is expressed by the word *o*, and this preposition is used very freely to express obvious relationships, much as it was in old English where it was possible to say, "He was killed of a stone," "They were found of their enemies," "He did it of a Monday morning." By the addition of *o* to adjectives—and in a few cases to other parts of speech as well—prepositions may be formed from them. As these are not quite so obvious in meaning as the words we have up till now considered, a list of the commoner ones is appended.

We have not so far dealt with the combination of two consonants, but it will be as well to say here that *s*, which has movement for its primary meaning, is incorporated in prepositions to give the idea of motion. So from many adjectives we get two useful prepositions of kindred meaning, the one implying rest, the other motion to or from.

From *ab*, "agreeable," we get *abo*, "in accordance with."

From *ak*, "hostile," we get *ako*, "against," and *akso*, "against" (motion).

From *ad*, "fixed," we get *ado*, "at," and *adso*, "to, towards."

From *af*, "small," we get *afo*, "near," and *afso*, "near."

From *ag*, "great," we get *ago*, "far from," and *agso*, "from."

From *an*, "low," we get *ano*, "under," and *anso*, "down, under."

From *ap*, "light," we get *apo*, "outside," and *apso*, "out of."

From *ar*, "dark," we get *aro*, "in," and *arso*, "into."

From *av*, "high," we get *avo*, "upon," and *avso*, "up."

Inflections.

Inflections are, of course, reduced to the smallest number possible.

The noun is inflected for number only, the plural being formed by the addition of *y* to the singular, e. g.:

beg, "dog," *begy*, "dogs"; *sigi*, "finger," *sigi y*, "fingers"; *bagrag*, "whale," *bagragy*, "whales."

It is true that from the word *bigu*, which signifies "dog" generally, we can form the words *biguam*, "a male dog," and *bigual*,

"a female dog," but these are compound words rather than inflections in the grammatical sense of the word.

Case is expressed as in English by the position of the word in the sentence, and not by inflection as in Latin. The nominative precedes the verb, the objective follows it, or comes after a preposition.

Maf imi bigu means "The child holds the dog."

Bigu imi maf means "The dog holds the child."

Zer o mamaf i at means "The boy's drum is blue."

The adjective is not inflected either for gender, number, case or degree of comparison. The comparative and superlative are expressed, as in the case of the longer adjectives in English, by putting words equivalent to "more" and "most" before the simple form of the adjective.

The verb is inflected for tense, mood, and voice, but not for person and number. The last two are quite unnecessary when, as in most modern languages, the pronoun is expressed, and in Tēl they are accordingly not found.

The verbal inflections are added immediately to the verbal sign *i*, and precede the letters which contain the meaning of the verb.

The future is shown by the presence of the letter *r*: *ipi*, "to pierce; fut., *me irpi*, "I shall pierce."

A *t* is the sign of the past tense: *me itpi*, "I pierced," "I have pierced," or "I did pierce."

By combining these two we get the future perfect tense: *me irtpi*, "I shall have pierced."

Should any difficulty be experienced in pronouncing the combination thus formed—or indeed at any time in the language Tēl—an atonic *e* is inserted, e. g., *me irteba*, "I shall have smiled." This *e* is scarcely sounded at all just as in our "the" when said quickly in the middle of a sentence. In writing, this *e* may be omitted altogether, as was always done in the old Egyptian and kindred languages; but it is a good plan for a beginner to put it in, using for the purpose a different form of the letter—say the Greek *ε*—to distinguish it from the letter which indicates the idea of "hearing." Throughout the remainder of this article a small superior *e* is used to denote this atonic vowel.

The pluperfect is formed by doubling the *t* which signifies the past, inserting the atonic *e* to enable the double sound of the *t* to be heard: *me itetpi*, "I had pierced."

L is the sign of the conditional mood:

Me ilpi, "I should pierce"; *me iltpi*, "I should have pierced."

The infinitive does not differ in form from the indicative:

Mar itga ieb, "The negro wished to sing."

Mamaf ilga itmi vat, "The boy would like to have caught the blue bird."

Zip imta irpi zil, "The needle was seen to be about to pierce the cushion."

The word *imta* in the last example belongs to the passive voice. This is shown by putting the letter *m* immediately after the verbal sign *i*, before the letters indicating mood and tense:

Me ipi, "I pierce"; *Me impi*, "I am pierced." *Me itetpi*, "I had pierced"; *Me imetetpi*, "I had been pierced."

The full conjugation of the verb *imi*, "to hold" or "have," is as follows:

ACTIVE.	PASSIVE.
Pres. <i>Me imi</i> , I hold	<i>Me imemi</i> , I am held
Fut. <i>Me irmi</i> , I shall hold	<i>Me imermi</i> , I shall be held
Past. <i>Me itmi</i> , I held, I have held	<i>Me imetmi</i> , I was held, I have been held.
Fut-pf. <i>Me irtmi</i> , I shall have held	<i>Me imertmi</i> , I shall have been held
Plupf. <i>Me itetmi</i> , I had held	<i>Me imtetmi</i> , I had been held
Condit. <i>Me ilmi</i> , I should hold	<i>Me imelmi</i> , I should be held
..Past. <i>Me iltmi</i> , I should have held	<i>Me imelimi</i> , I should have been held
Inf. pres. <i>imi</i> , to hold	<i>imemi</i> , to be held
..Fut. <i>irmi</i> , to be about to hold	<i>imermi</i> , to be about to be held
..Past, <i>itmi</i> , to have held	<i>imetmi</i> , to have been held

There is in Tël no distinction between nouns and pronouns, the latter being expressed by the use of certain nouns.

"I" is *me*, the person heard, the speaker. "Thou" is *ma*, the person seen. For the pronoun of the third person whether "he" or "she," the word *me* is used which is really simply "the person." If the speaker wishes to emphasize the sex, however, he will use *mam* for "he," and *mal* for "she." In the case of animals *be*, *ve*, *pe* or *fe* will be employed instead of *me*, according to the class of animal referred to; whilst "it" is *de*, i. e., "thing."

In all cases the plural is formed as in other nouns by adding *y* to the singular. Of course the remarkable custom so prevalent

in modern languages, of saying "you" when we mean "thou" will have no place in Tēl, and "you" must always be translated by *ma* when one person only is addressed. The objective case is of the same form as the nominative, and the possessive is expressed by means of the preposition *o*: *Mal itetago me d-imrar o ma*, "She gave me your letter."

The demonstrative pronouns "this" and "that" are respectively *dafo* and *dago*, that is to say, *d*, "thing" compounded with *afo*, "near" and *ago*, "far." The corresponding *mafo* and *mago*, referring to persons, are our "the latter" and "the former."

Mafo (plural, *mafoy*) is also used for all the reflexive pronouns which refer to persons, e. g.: *Me irshi mafo*, "I shall cut myself"; *Mamafy itetki mafoy*, "The boys had hurt themselves." *Dafo*, *dafoy* are the corresponding "itself, themselves."

We now come to a very important feature of Tēl. This is the use of the "long" vowels. And here it will be as well to say a word as to pronunciation. As Tēl is intended for use as a universal language, it will be best to give to the vowels what are to-day their most widely accepted values, and not those which are peculiar to the English tongue. The following are therefore suggested as the best values to give them:

a has the sound of *a* in "father," *ā* that of *a* in "all."

e has the sound of *e* in "pen," *ē* that of *ai* in "pain."

i has the sound of *i* in "pin," *ī* that of *i* in "machine."

o has the sound of *o* in "not," *ō* that of *o* in "note."

u has the sound of *u* in "put," *ū* that of *oo* in "boot."

The long vowels are used to signify the same sense as the corresponding short ones, but with the meaning transferred to the mental plane.

Thus, long *a* means "appearing to the mind's eye" and "seeing with the mind's eye."

Long *e* means "heard by the mind's ear," "learned"; and "hearing with the mind," "apprehending," "understanding."

Long *i* means "felt by the mind," and "touching with the mind."

Long *o* means "savoring of," etc., and "tasting with the mind."

Long *u* means "having the scent of to the mind," i. e., "suggesting"; also "suspecting," "guessing" etc.

A few examples will show what a wide range of ideas may now be expressed.

Whereas *iab* is "to be well-looking"; i. e., "to flourish," "to

be in health"; *iāb* is "to be well-seeming to the mind"; i. e., "to be favorably received," "to be granted," "accepted."

Iba is "to look kindly," "to smile"; *ibā* is "to look kindly on with the mind," "to receive favorably," "to accept."

Iak is "to be ugly," "unbecoming," "in bad condition"; *iāk* is "to seem ugly to the mind," "to be unacceptable," "to displease."

Ika is "to look foully on," "to scowl"; *ikā* is "to view hostilely with the mind," i. e., "to refuse," "to reject."

Ab is "beautiful to look at"; *āb* is "beautiful to the mind," "pleasant."

Ief is "to emit a faint sound"; *iēf* is "to be dimly understood."

Ife is "to hear faintly"; *ifē* is "to understand but slightly."

Im is "hard"; *īm*, "difficult."

Imi is "to touch masterfully," i. e., "to grasp," "hold," "have"; *imī*, "to comprehend," "to know."

Ok is "nasty to eat"; *ōk*, "revolting" (to the mind).

Ug is "strong-smelling"; *ūg*, "reminding strongly" (of).

So far we have considered the building of words which comprise not more than three ideas, and these we have found to consist of one, or at most two, syllables. These root words are, however, capable of being combined in a great variety of ways, giving new words of more precise meaning.

In making these compound words it must be borne in mind that the qualifying syllable or letter always follows, never precedes, that which it qualifies.

The qualifying syllable may be originally a noun, an adjective, a verb, or even sometimes a preposition or an adverb.

The word *bag* is "the animal which looks great," and so may stand for any big beast. By adding as a second syllable *rag* which is "the great water," i. e., "the sea," we get *bagrag*, "the whale." If instead of *rag* we add *ris*, "the moving water," i. e., "river," we get *bagris*, "hippopotamus." *Baged* is "the big beast with the deep voice," "elephant." Whilst *bagsiusip*, "big beast nose horn" is "rhinoceros."

Berob, "the grunting animal, good to eat," gives us the "pig." Then from this or any noun we may get a new series of adjectives, e. g.: *A-berob*, "looking like a pig." (It will be as well, by the way, during the earlier stages of our acquaintance with Tēl to separate the elements of the word by hyphens [*a-ber-ob*], or we may be misled into reading the first two letters as *ab*, "beautiful"). *E-ber-ob* is "sounding like a pig," *i-ber-ob* "feeling like a pig," *o-ber-ob*

"tasting like pork," *u-ber-ob* "smelling like a pig." From each of these adjectives, again, the corresponding abstract noun can be formed by prefixing *t*: *ta-ber-ob*, "piggishness"; *to-ber-ob*, "a pork-like flavor."

From any noun a verb may be made by the simple expedient of putting the verbal prefix in front of it. Thus from *rar*, "ink," we have *i-rar*, "to write." (Conjugation: *ire-rar*, *it-rar*, *irt-rar*, *itet-rar*, *il-rar*, *ilt-rar*; Passive: *im-rar*, *imer-rar*, *imert-rar*, *imtet-rar*, etc.)

Especially important is the series formed from abstract nouns. These are what are generally called "factitive verbs"; for example, *i-tab*, from *tab*, "beauty," means "to make beautiful," to "beautify." *Tol*, "sweetness," gives *i-tol*, "to sweeten." So we have, *i-tav*, "to raise," *i-tath*, "to level," *i-tif*, "to lighten," *i-tom*, "to salt," *i-tuk*, "to make to stink," and so forth. The only drawback to these is that they are in the present tense of the same form as the past tense of those of the series *iab*, *ieb*, etc. For instance, *it-ar* is the past tense of the verb *iar*, and so means "was dark," whilst *i-tar* means "darkens." But neither in the spoken nor the written language will this be found to cause any confusion in practice.

A LIST OF THE SIMPLE VERBS FORMED ON THE VOWEL "A" (SIGHT).

- iab*, thrive; *iāb*, to be correct; *iba*, smile; *iḅā*, like; *itab*, beautify; *itāb*, to perfect.
iak, to decay; *iāk*, to look bad; *ika*, to scowl; *iḱā*, to dislike; *itak*, to mar; *itāk*, to destroy.
iad, to be still, to sleep; *iād*, to be at rest; *ida*, to gaze; *iḍā*, to investigate; *itad*, to still; *itād*, to settle.
iaf, to be small; *iāf*, to be unimportant; *ifa*, to see badly; *iḡā*, to misunderstand; *itaf*, to diminish; *itāf*, to belittle.
iag, to be great; *iāg*, to matter; *iga*, to see well; *iḡā*, to long for; *itag*, to enlarge; *itāg*, to extol, praise.
ial, to be feminine; *iāl*, to yield; *ila*, to be coy; *iḷā*, to cajole; *ital*, to make effeminate; *itāl*, to subdue.
ian, to be low; *iān*, to be contemptible; *ina*, to look down; *iṇā*, to despise; *itan*, to lower; *itān*, to lower.
iam, to be masculine; *iām*, to prevail; *ima*, to look sternly; *iṃā*, to judge; *itam*, to make manly; *itām*, to enforce.
iap, to be light; *iāp*, to be clear; *ipa*, to look sharply; *iḫā*, to scrutinize; *itap*, to whiten; *itāp*, to make clear, demonstrate.

iar, to be dark; *iār*, to be hard to understand; *ira*, to frown; *irā*, to puzzle over; *itar*, to darken; *itār*, to involve.
ias, to live; *iās*, to exist in the mind; *isa*, to glance; *isā*, to take in at a glance; *itas*, to create; *itās*, to vivify.
iav, to stand up; *iāv*, to be eminent; *iva*, to look up; *ivā*, to reverence; *itav*, to heighten; *itāv*, to raise (hopes, etc.)
iaz, to be red; *iāz*, to be exciting; *iza*, to look eagerly; *izā*, to regard with enthusiasm; *itaz*, to redden; *itāz*, to excite.
iath, to be level; *iāth*, to be fair, just; *itha*, to look calmly; *ithā*, to consider; *itath*, to level; *itāth*, to adjust.

Two consonants may be used to qualify the same sense vowel. In such a case it does not in the least matter, so far as the sense is concerned, which of them comes first. Thus "green" may be either *atesh* or *ashet*, whichever happens to be the easier word to say. You cannot be misunderstood either way.

The numeral adjectives are distinguished by beginning with the letter *y* which, as has been seen, is the sign of the plural in nouns.

The first ten numbers are each formed of a word connected in some way with the number indicated. The others are formed by composition from these.

1 is <i>ysav</i> (head)	6 is <i>ytit</i> (frost)
2 is <i>ysia</i> (eye)	7 is <i>ydaḥ</i> (planet)
3 is <i>ykaḥ</i> (lily)	8 is <i>ylis</i> (wind)
4 is <i>yset</i> (hoof)	9 is <i>yteg</i> (knowledge)
5 is <i>ysigi</i> (finger)	10 is <i>yāb</i> (perfect)

The numbers from eleven to nineteen are made by putting "ten" before "one," "two," "three," etc.: 11, *yābsav*, 12, *yābsia*, 13, *yābkaḥ*, and so on.

The multiples of ten have the multiplier in front of the *āb*: 20, *ysiāb*; 30, *ykaḥpāb*; 40, *ysetāb*; 50, *ysigāb*, etc., the words for twenty and fifty being contracted where the two vowels come together. 100 is *yābag*, "great ten."

The ordinals are expressed by, *o shysav*, i. e., "of place one"; *o shysia*, "of place two," *o shykaḥ*, "of place three," etc.

The adverbs "firstly," "secondly," "thirdly" are made by adding the adverbial sign *u* to the cardinal numbers: *ysavu*, *ysiau*, *ykaḥu*, etc.

Words including the idea of number in a less definite manner are: *y*, "some"; *yag*, "many"; *o thy*, "sometimes"; *o thyag*, "often"; the construction of these should present no difficulty to the student.

Interrogation is expressed by beginning the sentence with the word *que*, or some word beginning with *qu*.

Que siay o mafal i ar?, "Are the girl's eyes dark?"

Interrogative words are: *Quado*, "where"; *quadso*, "whither"; *quasso*, "whence"; *quo*, "why"; *quem*, "who"; *quede*, "what"; *quagu*, "how" (to what degree); *quabu*, "how" (in what manner); *quethe*, "when."

The letter *n* as an initial is reserved to express the idea of negation. First we have the simple *ne*, "not." Then we get such adjectives as *nish*, "blunt," from *ish*, "sharp"; and nouns such as *tenish*, "bluntness," corresponding to *tish*, "sharpness." In verbs the *n* comes before the root but after the verbal prefix; e. g., from *iath*, "to be level," we have *inath*, "to be rough," *itenath*, "would have been rough"; and from *itath*, "to level," *itenath*, "to roughen," with passive pluperfect, *imetet-tenath*, "had been roughened."

One of the most striking features of a language formed on such principles as these is its economy of material, since every combination of sounds carries with it a definite meaning. Whereas all the languages now in use, and probably all the languages which ever have been used, are encumbered with sesquipedalian terms while at the same time they wastefully make no use at all of numbers of the shortest and most easily pronounced combinations.

Thus in our own language we have indeed the words "dig," "dog," and "dug," each compactly and clearly expressing an idea. But we have attached no meaning at all to the equally clear and simple sounds "dag" and "deg."

These simple monosyllables are wasted whilst we take up our time and exhaust our inkpots with such words as "notwithstanding" and "anthropomorphism."

If you take the consonants in pairs and place between them in succession each of the five vowels, you will find, I think, that only in the case of the *b-g* series—*bag*, *beg*, *big*, *bog*, *bug*—are all the five resulting words made use of in English.

Now in Tël every such combination would have its meaning and express an idea consisting of three elements. Thus *dag* is "a thing which looks big" and *deg* is "a loud sounding thing."

The foregoing pages do not, of course, claim to contain a perfect language, but only to suggest a principle on which, if a few competent persons were to work together, they might soon evolve a code in which any person who can read and write would be able to express at least his simpler thoughts to any other person equally

educated, quite irrespectively of the linguistic affinities of their native tongues.

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MOTOR RELATIONS OF SPEECH AND IDEA.

Listening to a casual conversation in some foreign tongue gives us an impression in which even the word spacing escapes notice, so that we speak of hearing the "chatter" of Turkish, of Japanese, just as we refer to our perception of the sounds of birds. This paper desires to carry onward some studies in which motor equations are substituted for an understanding of the basis of expression of ideas as sound in words. The expression of signs in words, coming down through the employment of pictures to arbitrary marks is not a parallel study. But it seems interesting to compare, if possible, all languages upon a basis of movements, muscular and osseous. That one movement should be selected and not another is evidently a matter less of chance than convenience. Birds having no teeth will not enunciate dental equivalents. On the other hand, a preference for dental equivalents among a vast majority of languages may indicate a group idea having a basic muscular value.

To eat suggests taste. To eat suggests having within the mouth. So teeth, cheeks, lips, tongue and palate are concerned. But teeth, to a mammal suggest in an especial manner the function of eating. The teeth bite off, as well as chew, so that a word "to eat" without a dental sound might be quite avian, but scarcely mammalian. Eating is not performed in the pharynx, or throat. A guttural letter would scarcely denote the verb "to eat," although in a too hasty swallowing, as "to gulp," we recognize the fitness of the word.

Let us preface a table of the chief consonants:

1. Labial: *p—b—ph (f)—bh (v)*.
2. Lingual: *t—d—th—dh*.
3. Guttural: *k—g—kh—gh*.
4. Sibilant: *s—z—sh—zh (French j)*.
5. Compound: *ts—dz—tsh (ch, in church)—j (English)*.

The liquids and others:

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|-------------------------|----------------------------|
| 1. Labial: <i>m—w</i> . | 2. Lingual: <i>n—l—y</i> . |
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